Total Estimated Plume Containment Cost - March 2015		
Total Extraction Wells:		20
Total design well flow:		20.2 MGD
Total base containment and VOC & Iron treatment cost:	$	276,253,424
Total Dioxane treatment cost:	$	74,214,898
Total Perchlorate treatment cost:	$	27,971,070
Grand Total Plume Containment and Treatment Cost:	**$**	**378,439,392**

Goal:

* The NYSDEC must consider plume containment of the entire comingled OU-2 and OU-3 plume.

Required treated water flow:

*Given an average horizontal groundwater flow rate of 1 foot per day, a conceptual hydraulic barrier of 9,000 feet wide by 600 feet deep by 1 foot thick, and an average porosity of 25 to 40%, a preliminary theoretical withdrawal rate of approximately 20 MGD would be needed in the identified zone.

*The January 2012 Navy Study calculates that 14,000 gpm or 20.16 MGD of groundwater flow would be required to be captured. based on a plume width of 9,000 feet. Therefore MWD will use the more conservative value of 20.2 MGD.

Overview concept map: Click here for map

Plume containment schematic: Click here for schematic

Plume containment system map: Click here for system map

Total Estimated Base Cost - March 2015

(Base Remediation Treatment : Iron removal and air stripping treatment for VOC removal)

Total Extraction Wells:	20	
Total design well flow:	20.2	MGD
Total March 2012 base treatment cost:	$253,443,509	
Total March 2015 base treatment cost:	$276,253,424	(1)

Note:

(1) - based on 3% increase per year

Estimated Dioxane Treatment Removal Cost - March 2015

(Source - TrojanUV - March 17, 2015)

Design flow:	2800	gpm
	4.03	MGD
Design Influent:	20	ppb
Design Effluent:	BDL	ppb
Treatment:	UV and H202 - Two trains of 2 PHOXD72AL75 (which is two reactors)	
Capital Cost:	$1,700,000	
Operational Cost:	$148,027	Annual peroxide cost
	$145,769	Annual electrical cost
Total Annual Operating Cost:	$293,796	

Treatment System Capacity (MGD)	Capital Cost	Annual Operating Cost	Present Worth Cost	Total Cost
4.03	$1,700,000	$293,796	$13,106,240	$14,806,240

Cost per MGD Treated: $3,674,005

Cost to Treat 20 extraction wells (20.2 MGD): $74,214,898

Present Worth of Annual Operations:

A (F/A)(i= 2.6%, n=30 years)		
A =	$293,796	
)(i= 2.6%, n=30 years) =	44.61	
F=	**$13,106,240**	

Estimated Perchlorate Treatment Removal Cost - March 2015

(Source - Wellhead Treatment Report for Riverhead Well 16)

Design flow:	1600 gpm
	2.3 MGD
Design Influent:	18 ppb
Design Effluent:	2.5 ppb
Treatment:	Fixed bed resin
Capital Cost:	$522,500
Operational Cost:	$59,680

Treatment System Capacity (MGD)	Capital Cost	Annual Operating Cost	Present Worth Cost	Total Cost
2.3	$522,500	$59,680	$2,662,325	$3,184,825

Cost per MGD Treated: $1,384,706

Cost to Treat 20 extraction wells (20.2 MGD): $27,971,070

Present Worth of Annual Operations:

(F/A)(i= 2.6%, n=30 years)	
A =	$59,680
(i= 2.6%, n=30 years) =	44.61
F=	**$2,662,325**

Capital Task	Estimated Task Capital Cost
Remediation Wells and Vaults	$7,845,000
Transmission piping to remediation treatment system and injection wells / recharge basin discharge	$18,235,800
Remediation Well Treatment System (Air Stripping and Iron Removal)	$39,650,000
Treated water injection wells	$3,000,000
Construction subtotal:	$68,730,800
Engineering design, permits and construction admin.:	$13,746,160
Inspection:	$3,436,540
Legal:	$859,135
Contingencies (20 %):	$13,746,160
Subtotal Total Capital:	**$100,518,795**
Operating Task	**Estimated Task Operating Cost**
Remediation Wells	$64,514,167
Transmission piping	$2,430,384
Remediation Well Treatment System	$71,184,279
Injection Wells	$14,795,883
Subtotal Total Operating:	**$152,924,714**
Total Cost:	**$253,443,509**
Total cost per MGD extracted and treated:	**$12,546,708**

Groundwater capture rate: 14,000 gpm
20.2 MGD

Plume width: 9,000 feet

Notes: Navy study uses 20 extraction wells over 9,000 ft (10 intermediate and 10 deep - deep and intermediate same site) co-located at same site. MWD concurs with the aproach.

Item	Diameter (in)	Depth (ft)	Flow (gpm)	Number of wells	Total depth (ft)	Cost per foot	Total
Remediation Wells and Pumps-Intermediate	16	300	1000	10	3,000	$480	$1,440,000
Remediation Wells and Pumps-Deep	12	750	400	10	7,500	$450	$3,375,000
					Remediation well construction subtotal:		$4,815,000

Item	Number of units	Unit Cost	
Remediation Well Vaults - connecting piping and electric	10	$303,000	$3,030,000
		Total Capital Cost for Remediation Wells and Vaults:	**$7,845,000**

Note: Cost estimate is based on recent well drilling bid values. A 600 foot deep, 20-inch diameter well with a design capacity of 1400 gpm yields a unit cost of $480 per foot.
Click here for reference bid tab

Vault cost summary (reference RDWD0601) - bid and construction 2008

Electrical	Reference
Site Work	2,500
New Electrical Pole	5,000
Secondary Electrical Service	7,500
Panelboard/meter	7,500
Misc. Equipment	4,000
Conduit and Wiring	4,000
Subtotal Electrical:	30,500
2012 Electrical Cost:	$36,600

Mechanical	Reference
Site work	25,000
Piping	50,000
Vault	115,000
Controls & comm.	18,000
Testing & start-up	6,000
Site restoration	8,000
Subtotal Mechanical:	222,000
2012 Mech. Cost:	$266,400

		Number of units
1000 gpm remediation well pump-	75 hp	10
400 gpm remediation well pump-	25 hp	10

ANNUAL ELECTRICAL OPERATING COSTS

1. Electric Utility Provider: LIPA
2. Electrical Rate Code: 281

3a. Electrical demand per 75 hp pump: 56 kw

3b. Electrical demand per 25 hp pump: 19 kw

4. Annual Hours of Operation: 8,322 (based on 95% run time)

Demand Charges

Monthly rate ($/kw)	Demand (kw)	months	Annual Cost per unit	Total Annual Cost
19.65	56	12	$13,228	$132,284
19.65	19	12	$4,409	$44,095
		subtotal demand charges:		$176,378

Consumption Charges

Demand (kw)	Annual Hours	Annual Demand Hours	Electical Rate Charge	Annual Cost per unit	Total Annual Cost
56	8,322	466,864	0.0485	$22,643	$226,429
19	8,322	155,621	0.0485	$7,548	$75,476
			subtotal consumption charges:		$301,906

Total Annual Electrical Operating Costs: $478,284

ANNUAL LAB MONITORING OPERATING COSTS

1. VOC Sample Rate Charge = $205 / Sample (1 per month)
2. Annual IOC Water Sample Required for Raw Water
3. IOC Sample Rate Charge = $375 / Sample (1 per year)

Annual Lab Monitoring Operating Cost per well = ($205 x 12)+($375 x 1) = $2,835

Total Annual Lab Monitoring Operting Cost for 20 wells: $56,700

ANNUAL WELL INSPECTION & REHAB. LABOR COSTS

1. Required Well Inspection and Sampling = 2 hrs /month per well
2. Required Additional Man-hours = 2 Hrs / Day x 12 months / year x 20 wells= 480
3. Hourly labor rate = $60

Total Annual Labor costs: $28,800

Annual Costs Associated with 50 Year life of new equipment

Rehabilitate well Pump and Motor Every Five Years Cycles (over 50 years) = 10

Cost for well Pump and Motor Rehabilitation =	$9,500	
Lifetime Costs for well Pump and Motor Rehabilitations = $9,500 x 10 =		$95,000
Replace well Pump and Motor Every Fifteen Years	Cycles (over 50 years) = 3.3	
Cost for well well Pump and Motor =	$75,000	
Lifetime Costs for New Well Pumps and Motors = $75,000 x 3.3 =		$247,500
	subtotal lifetime cost per well:	$342,500
	subtotal lifetime cost for 20 wells:	$6,850,000
	Total Annual Equipment costs over 50 year life:	**$137,000**

Sum of Annual Operation Cost for Remediation Wells:	**$700,784**

Present Worth Value:

F= A (F/A)(i= 2.3%, n=50 years)

A =	$700,784
(F/A)(i= 2.3%, n=50 years) =	92.06
F=	$64,514,167

Present Worth Value of Remediation Well Operating Cost:	**$64,514,167**

man-hours

Transmission piping to remediation treatment system and injection wells / recharge basin discharge:

Pressure rating: 100 psi

Pipe (feet)	Diameter (in)	Material	Unit Cost[(2)] (per ft.)	Total Capital Cost
21,000	20	PVC (AWWA C905 - DR25)	$64	$1,344,000
30,000	20	HDPE (DR 21)	$88	$2,640,000
		Fittings, valves and misc.:		$796,800
		subtotal transmission piping:		$4,780,800

Restoration:

Area	feet	Unit Cost (per ft.)	Total Capital Cost
Grass	21,000	$5	$105,000
Town Roads	30,000	$400	$12,000,000
		Misc. restoration:	$350,000
		subtotal restoration:	$12,455,000

Directional Drilling - Major Road Crossings

5 crossings - 400 ft per crossing		$500	$1,000,000
5 crossings			
400 ft average crossing			
2000 ft of directional drilling			
	subtotal directional drilling:		$1,000,000

Total Capital Cost for Transmission Piping: $18,235,800

Notes:

(1) The 20.2 MGD flow will be split to direct extracted groundwater to two treatment system plants (east and west). Maxium flow to be transferred by transmission piping will be 10.1 MGD to treatment plant and discharge locations.

(2) There a three options in type of pipe to be used Cement Lined ductile iron (CLDI) vs. High Density polyethylene (HDPE) vs. Pressure rated PVC. Installed pricing is estimated using material costs x a factor 2.5 for HDPE and CLDI and 2.0 for PVC to account for labor, equipment, etc.

CLDI (Pressure Class 350):

16" - $120/ft.

20" - $168/ft.

CLDI (Special Class 52) – has thicker wall, higher pressure rating and is more common:

16" - $140/ft.

20" - $183/ft.

PVC (AWWA C905 - DR25):

18" - $52/ft.

20" - $64/ft.

HDPE (DR 9 – Pressure Rating = 200 psi):

18" - $123/ft.

20" - $153/ft.

HDPE (DR 13.5 – Pressure Rating = 160 psi):

18" - $103/ft.

20" - $128/ft.

HDPE (DR 17 – Pressure Rating = 125 psi):

18" - $85/ft.

20" - $103/ft.

HDPE (DR 21 – Pressure Rating = 100 psi):

18" - $73/ft.

20" - $88/ft.

Note, installing in a right-of-way, NYSP and DOT may require ductile or HDPE.

(4) Restoration (assumes 6 ft wide trench):

Grass areas - $ 5 /ft

Town Roads - $ 400 / ft

County Roads- $ 750 /ft

State Roads - $2,500 / ft

Leak repair / inspection

ANNUAL REPAIR and INSPECTION LABOR COSTS

1. Inspection = 40 hours per year
2. Required Additional Man-hours = 40 man-hours
3. Hourly labor rate = $60

Total Annual Labor costs: $2,400

Annual Leak Repair

Leaks per year 2 Repair cost: $12,000 (Labor, material and restoration)

TOTAL ANNUAL REPAIR costs: **$24,000**

Sum of Annual Operation Cost for Transmission pipes: $26,400

Present Worth Value:

F= A (F/A)(i= 2.3%, n=50 years)

A = $26,400

(F/A)(i= 2.3%, n=50 years) = 92.06

F= $2,430,384

Present Worth Value of Remediation Well Operating Cost: $2,430,384

Remediation Treatment System - 4.0 MGD Plant

Click here for link to design parameters

1	Site work, drainage and utilities, landscaping	450,000
2	Stainless steel air stripping towers with packing, blower and blower motor, inlet weir, redistribution, inlet air filtering and liquid collection	950,000
3	Treatment Building, general construction	875,000
4	Installation of electrical controls and power distribution associated with the treatment system, new generator set	1,800,000
5	Clearwell Installation	400,000
6	Mechanical work and plant piping	450,000
7	Booster pump work	250,000
	AIR STRIPPING SUBTOTAL:	5,175,000
8	Iron removal treatment equipment, filter vessels, pretreatment equipment	980,000
9	Treatment building, misc. general construction	400,000
10	Backwash water equilization tank and equipment	425,000
11	Mechanical work, piping modifications	350,000
12	Electrical work, instrumentation, controls, modifications	600,000
	IRON REMOVAL TREATMENT SUBTOTAL:	2,755,000
	Total for Remediation Treatment System to Treat 4.0 MGD:	$7,930,000
	Total Treatment System Cost to Treat 20 MGD:	**$39,650,000**

Total capital for SFWD Plant 1 for 4.0 MGD	8,699,315
Air Stripping and Iron Removal	SFWD Contract G
Cost also included provisions for potable water treatment - ph, chlorine and corrosion control	SFWD Contract E

		Number of units per building	
1400 gpm effluent booster pump-	50 hp	2	(note 1 back-up will be provided per building)
8600 cfm tower blower -	15 hp	2	

ANNUAL ELECTRICAL OPERATING COSTS

1. Electric Utility Provider: LIPA
2. Electrical Rate Code: 281

3a. Electrical demand for two 50 hp booster pumps: 75 kw

3b. Electrical demand for two 15 hp blowers: 22 kw

4. Annual Hours of Operation: 8,322 (based on 95% run time)

5. Building heating - 40 kw electric heat

Heating season is seven months -October through April

Annual Hours of heating = 5,040

Demand Charges

	Monthly rate ($/kw)	Demand (kw)	months	Annual Cost
Pump	19.65	75	12	$17,638
Blower	19.65	22	12	$5,291
Heat	4.68	40	7	$1,310
		subtotal demand charges:		$24,240

Consumption Charges

Demand (kw)	Annual Hours	Annual Demand Hours	Electical Rate Charge	Annual Cost
75	8,322	622,486	0.0485	$30,191
22	8,322	186,746	0.0485	$9,057
40	5,040	201,600	0.0485	$9,778
		subtotal consumption charges:		$49,025

Total Annual Electrical Operating Costs: $366,325

ANNUAL BLOWER FILTER REPLACEMENT OPERATING COSTS

2. Filters Must Be Replaced Twice per Year
3. Cost of Replacing Filters = $1,100 per blower

Annual Filter Replacement Operating Costs = (($1,100. x 2) x2 = $4,400

Total Annual Filter Replacement Operating Costs: $22,000

ANNUAL LAB MONITORING OPERATING COSTS

1. VOC Sample Rate Charge = $205 / Sample (4 per month) - 2 raw and 2 treated per tower per month
2. IOC Water Sample Required for Raw and Treated Water (**Iron only**)
3. IOC (IRON only) Sample Rate Charge = $12 / Sample (4 per month) - 2 raw and 2 treated per tower per month

Annual Lab Monitoring Operating Cost per Plant = ($205 x 48)+($12 x 48) = $10,416

Total Annual Lab Monitoring Operting Costs: $52,080

ANNUAL PLANT OPERATIONS LABOR COSTS

1. Required Plant Monitoring and Sampling = 2 hrs / per day per plant
2. Required Man-hours = 2 Hrs / Day x 365 days/ year x 5 Plants= 3,650 man-hours
3. Hourly labor rate = $60

Total Annual Labor costs: $219,000

Annual Costs Associated with 50 Year life of new equipment

1. Iron Removal Media: (4 vessels)
   Replace Every Fifteen Years — Cycles (over 50 years) = 3.3
   Cost for Media Replacement = $125,000
   Lifetime Costs for Media = $125,000 x 3.3 = $416,667

2. Air Stripping Media: (2 towers)
   Replace Every Fifteen Years — Cycles (over 50 years) = 3.3
   Cost for Media Replacement = $120,000
   Lifetime Costs for Media = $200,000 x 3.3 = $400,000

3. Blowers (Total for two):
   Overhaul Blower Motor Every Five Years — Cycles (over 50 years) = 10.0

Cost for Blower Motor Overhaul = $2,000

Lifetime Costs for Blower Motor Overhauls = $2,000 x 10 = $20,000

Replace Blower Every Fifteen Years Cycles (over 50 years) = 3.3

Cost for New Blower = $4,500

Lifetime Costs for New Blowers = $4,500 x 3.3 = $15,000

4. Booster Effluent Pumps (Total of Two):

Rehabilitate Booster Pump and Motor Every Five Years Cycles (over 50 years) = 10.0

Cost for Booster Pump and Motor Rehabilitation = $10,000 (2 units)

Lifetime Costs for Booster Pump and Motor Rehabilitations = $10,000 x 10 = $100,000

Replace Booster Pump and Motor Every Fifteen Years Cycles (over 50 years) = 3.3

Cost for New Booster Pump and Motor = $56,000

Lifetime Costs for New Booster Pumps and Motors = $56,000 x 3.3 = $186,667

subtotal lifetime cost per Treatment Plant:	$1,138,333
subtotal lifetime cost for Five Treatment Plants:	$5,691,667
Total Annual Equipment costs over 50 year life:	**$113,833**

Sum of Annual Operation Cost for Remediation Wells: $773,238

Present Worth Value:

F= A (F/A)(i= 2.3%, n=50 years)

A = $773,238

(F/A)(i= 2.3%, n=50 years) = 92.06

F= $71,184,279

Present Worth Value of Remediation Well Operating Cost: $71,184,279

Treated water discharge rate: 14,000 gpm
20.2 MGD

Notes: Navy study uses a combination of injection wells and recharge basins.
MWD proposes to use injection wells for all discharge water.

Item	Diameter (in)	Depth (ft)	Flow (gpm)	Number of wells	Total Flow(gpm)	Total depth (ft)	Cost per foot	Total
Injection wells	10	300	350	40	14000	12,000	$250	$3,000,000
					Total Capital Cost for Injection Wells:			$3,000,000

Note: Cost estimate is based on recent well drilling bid values. A 600 foot deep, 20-inch diameter well with a design capacity of 1400 gpm yields a unit cost of $480 per foot. Therefore 10-inch injection well with no pump would be approximately $300 per foot.
Click here for reference bid tab

	Flow(gpm)	Number of units
Injection wells	350	40

ANNUAL WELL INSPECTION & SAMPLING LABOR COSTS

1. Required Well Inspection = 1 hrs /month per well
2. Required Additional Man-hours = 1 Hrs / Day x 12 months / year = 12 man-hours
3. Hourly labor rate = $60

Total Annual Labor costs: $720

Annual Costs Associated with 50 Year life of new equipment

Well Maintenance & Inspection Every Five Years — Cycles (over 50 years) = 10
Cost for maintenance and inspection = $6,000
Lifetime Costs for well maintenance and inspection = $6,000 x 10 = $60,000
Major redevelopment / rehabilitation every 10 yrs — Cycles (over 50 years) = 5
Cost for Rehab / Redevelopment = $35,000
Lifetime Costs for well rehab / re-development = $3,000 x 5 = $175,000
subtotal lifetime cost per well: $235,000
subtotal lifetime cost for 40 wells: $9,400,000

Total Annual Equipment costs over 50 year life: $188,000

Sum of Annual Operation Cost for Remediation Wells: $188,720

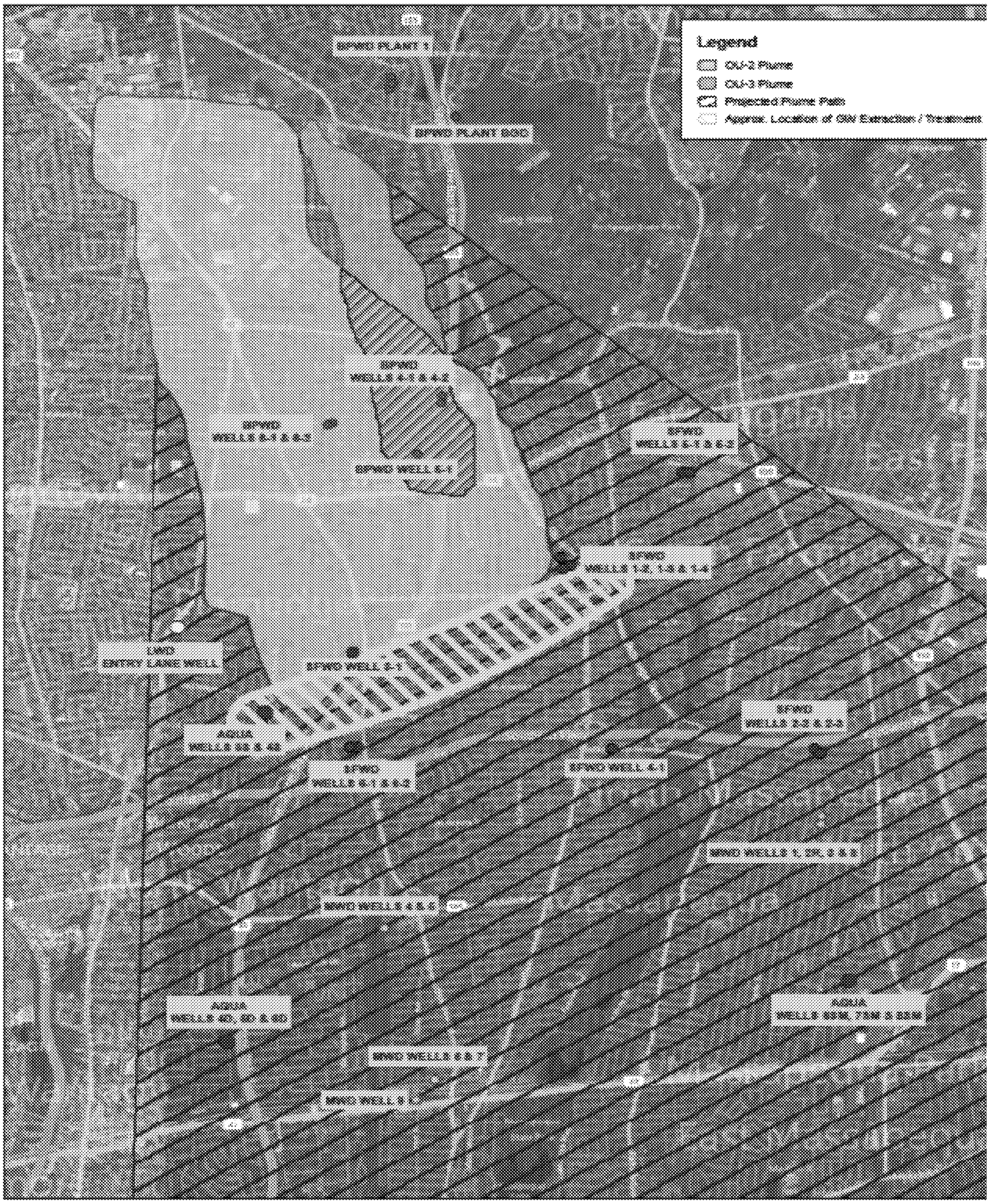
Present Worth Value:

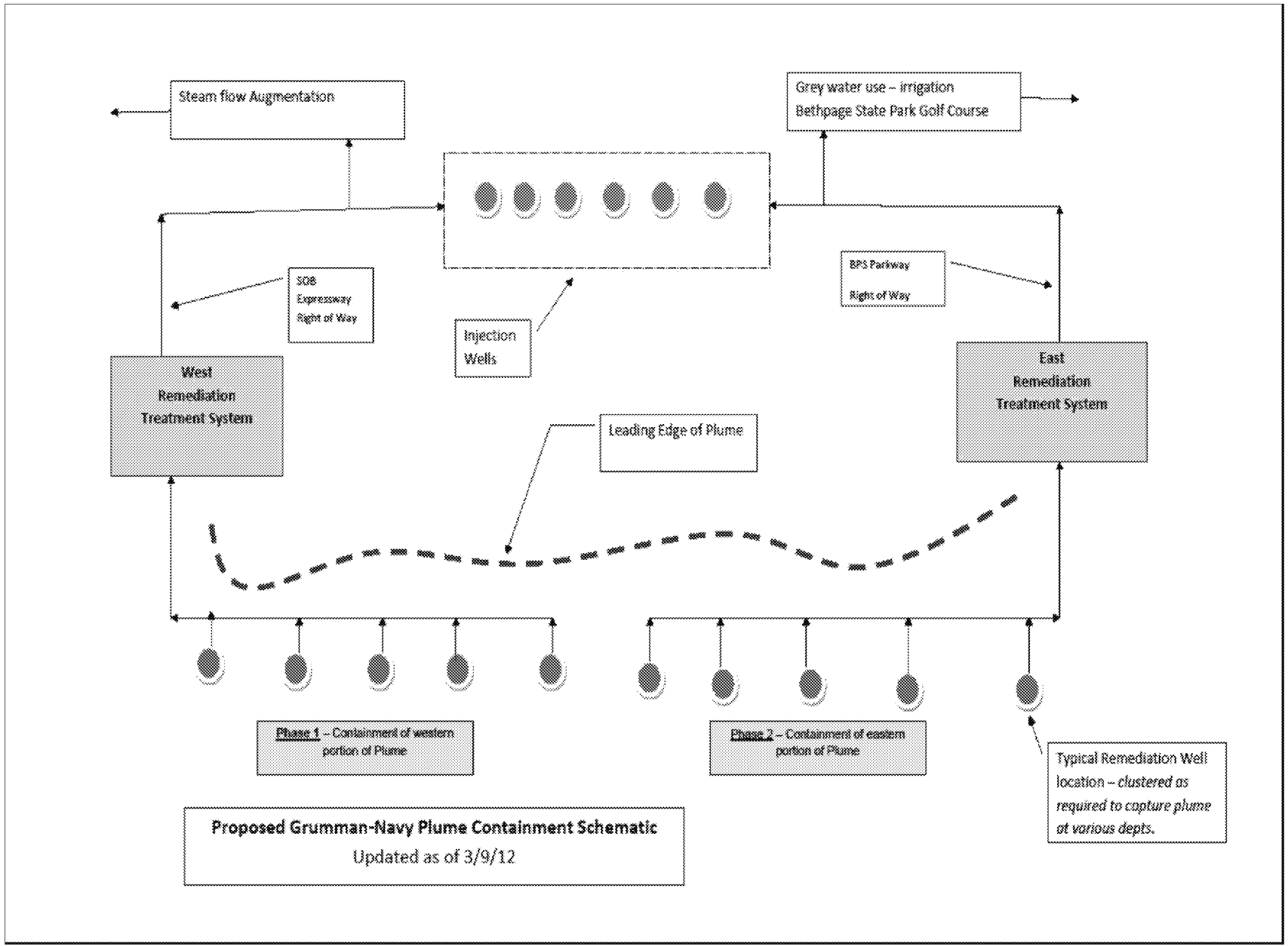
F= A (F/A)(i= 2.3%, n=50 years)

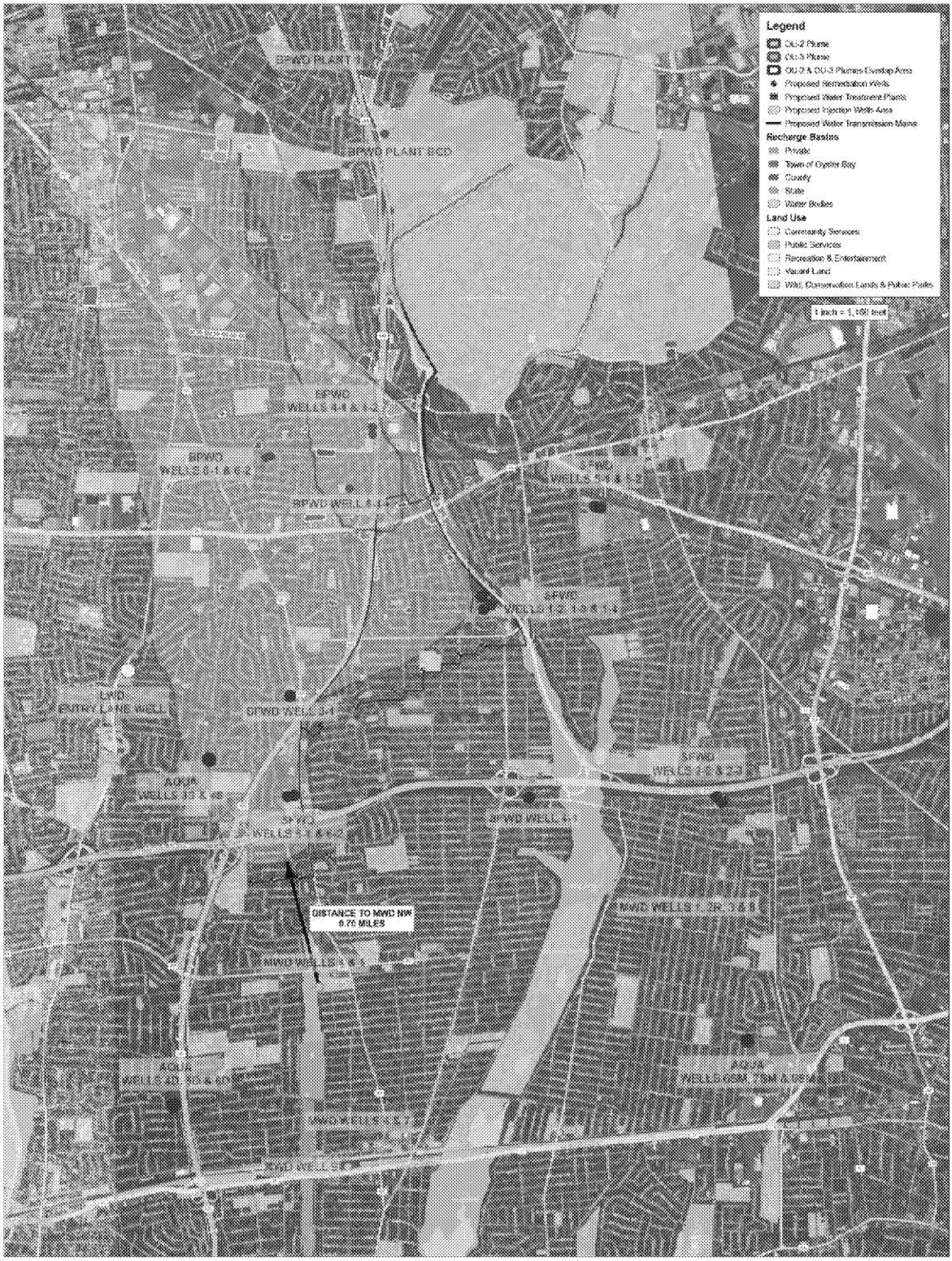
A = $160,720
(F/A)(i= 2.3%, n=50 years) = 92.06
F= $14,795,883

Present Worth Value of Remediation Well Operating Cost: $14,795,883

Navy Calculations (based on report) for injection well and recharge basin maintenance
Use $0.03 per thousand gallons discharged
Annual discharge: 20,200,000 GPD
7,373,000,000 GPY
7,373,000 1,000 GPY
Annual Cost: $221,190


Legend
OU-2 Plume
OU-3 Plume
Projected Plume Path
Approx. Location of GW Extraction / Treatment
BPWD PLANT 1
LWD
ENTRY LANE WELL


Steam flow Augmentation
Grey water use – irrigation
Bethpage State Park Golf Course
SOB
Expressway
Right of Way
Injection
Wells
BPS Parkway
Right of Way
West
Remediation
Treatment System
East
Remediation
Treatment System
Leading Edge of Plume
Phase 1 – Containment of western portion of Plume
Phase 2 – Containment of eastern portion of Plume
Typical Remediation Well location – clustered as required to capture plume at various depts.
Proposed Grumman-Navy Plume Containment Schematic
Updated as of 3/9/12


Legend
OU-2 Plume
OU-3 Plume
OU-2 & OU-3 Plumes Overlap Area
Proposed Remediation Wells
Proposed Water Treatment Plants
Proposed Injection Wells Area
Proposed Water Transmission Mains
Recharge Basins
Private
Town of Oyster Bay
County
State
Water Bodies
Land Use
Community Services
Public Services
Recreation & Entertainment
Vacant Land
Wild, Conservation Lands & Public Parks
1 inch = 1,166 feet
DISTANCE TO MWD NW
0.78 MILES

CLIENT NAME: Greenlawn Water District

PROJECT TITLE: Well Construction at Plant No. 3

PROJECT NO.: GLWD 11-01

BID DATE: July 26, 2011

ITEM NO.	DESCRIPTION	QTY.	UNITS	BIDDER: LAYNE CHRISTENSEN COMPANY, Holbrook, NY		BIDDER: EAGLE CONTROL CORPORATION, Yaphank, NY		BIDDER: DELTA WELL & PUMP, Ronkonkoma, NY		BIDDER: A.C. SCHULTES, INC., Woodbury Heights, NY		BIDDER: R.J. INDUSTRIES, Plainview, NY	
				BB		BB		BB		BB		NO BID	
				UNIT PRICE	TOTAL PRICE	UNIT PRICE	TOTAL PRICE	UNIT PRICE	TOTAL PRICE	UNIT PRICE	TOTAL PRICE	UNIT PRICE	TOTAL PRICE
1	Mobilization and Restoration	1	LS		$25,800.00		$23,000.00		$20,000.00				
2	Test Well Boring	1	LS		$81,200.00		$75,000.00		$225,000.00		$102,000.00		
3	Depth Adjustment - Test Well Boring (Contingency)	50	LF	$30.00	$1,500.00	$60.00	$3,000.00	$25.00	$1,250.00	$50.00	$2,500.00		
4	Additional Test Screen Setting (Contingency)	1	LS		$19,800.00		$17,700.00		$15,000.00		$1.00		
5	~~Placing and Removing Test Screen and Pump~~				--		--		--		--		
6	Abandonment of Test Well or Permanent Well (Contingency)	1	LS		$12,700.00		$11,250.00		$10.00		$1,000.00		
7	Well Construction	1	LS		$134,800.00		$160,000.00		$67,000.00		$260,000.00		
8	Well Development	1	LS		$13,700.00		$25,000.00		$10,000.00		$20,000.00		
9	Depth Adjustment Well Construction (Contingency)	50	LF	$40.00	$2,000.00	$60.00	$3,000.00	$30.00	$2,500.00	$130.00	$6,500.00		
10	Blank Stainless Steel Pipe or Screen Length for Well (Contingency)	20	LF	$140.00	$2,800.00	$150.00	$3,000.00	$125.00	$2,500.00	$230.00	$4,600.00		
11	Television Inspection, Caliper Logging and Plumbness and Alignment Testing of New Well No. 3R	1	LS		$4,700.00		$6,000.00		$1,000.00		$5,000.00		
12	Permanent Capping of Test Well (Contingency)	1	LS		$2,000.00		$1,000.00		$100.00		$1,000.00		
13	Cash Allowance	1	LS		$12,000.00		$12,000.00		$12,000.00		$12,000.00		
14	Disinfection and Testing	1	LS		$3,000.00		$4,200.00		$7,200.00		$6,000.00		
15	Record Documents	1	LS		$2,000.00		$2,000.00		$2,000.00		$2,000.00		
16	Abandonment of Existing Well No. 3	1	LS		$6,600.00		$17,500.00		$9,000.00		$10,000.00		
17	Re-Development for Well No. 3R (Contingency)	5	DY	$2,000.00	$10,000.00	$1,900.00	$9,500.00	$1,300.00	$6,500.00	$2,200.00	$11,000.00		
TOTAL BASE BID (ITEMS 1, 2, ~~5~~, 7, 8, 11, 13, 14, 15 & 16)					$288,600.00		$347,700.00		$353,200.00		$419,000.00		
TOTAL ALTERNATE BID (ITEMS 1, 2, 3, 4, ~~5~~, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 & 17)					$309,600.00		$396,150.00		$381,060.00		$445,601.00		

CONTINUATION SHEET *AIA DOCUMENT G703* (Instructions on reverse side) PAGE 1 OF 1 PAGES

1998 - RIVERHEAD WATER DISTRICT

AIA Document G702, APPLICATION AND CERTIFICATE FOR PAYMENT, containing
Contractor's signed Certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NUMBER: 1
APPLICATION DATE: 6/30/2007
PERIOD TO: 6/30/2007
ARCHITECT'S PROJECT NO.:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED FROM PREVIOUS APPLICATION (D+E)	E WORK COMPLETED THIS PERIOD	F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G TOTAL COMPLETED AND STORED TO DATE (D + E + F)	H % (G/C)	I BALANCE TO FINISH (C - G)	J RETAINAGE
1	PLANT 13AH38 ELEC WORK	22,100.00	0.00	11,050.00	45%	11,050.00	50.00%	11,050.00	552.50
2	PLANT 14 ELEC WORK	22,500.00	0.00	15,820.00	23%	15,820.00	70.00%	6,780.00	791.00
3	PLANT 16 ELEC WORK	23,400.00	0.00	0.00	30% 7,020	0.00		23,400.00	0.00
4	ADMIN BLDG	41,700.00	0.00	0.00	30% 12,510	0.00		41,700.00	0.00
5	CASH ALLOWANCE	25,000.00	0.00	0.00		0.00		25,000.00	0.00
6	REC DOCS	6,000.00	0.00	0.00		0.00		6,000.00	0.00
7	O & M'S	100.00	0.00	0.00		0.00		100.00	0.00
8									
9					37,360.00				
10									
11									
12									
13									
		139,900.00	0.00	26,870.00	0.00	26,870.00		113,030.00	1,343.50

BENSIN CONTRACTING, INC
WATER SUPPLY AND WASTE TREATMENT
652 Union Avenue, PO Box 388, Holtsville, NY 11742-0388
(631) 758-7200 FAX (631) 758-7219

FAX TRANSMITTAL SHEET

DATE 8/13/08

TO Tom Carmichael

FROM GARY Bensinger

NUMBER OF PAGES INCLUDING THIS ONE 3

MESSAGE Tom our Requisition # 4 for June for Riverhead has already been processed I wanted to have our estimate for July August Revised Please Review and advise if it is acceptable Note - All O&M manuals have been forwarded to your office and the current Booster Pump package is up our yard

Please call as soon as possible if all pages are not received.

SEND TO FAX NUMBER 699-4122

Well No.:	RW - 1000 gpm	***capacity:***	1000 gpm	***Aquifer:***	Magothy
Location:	Leading edge of plume	***Well pumps to:***	Treatment system	***Calculation Number :***	1
Date:	3/6/2012	***Calculated by:***	PJG		

Parameter	Input data	Parameter	Caclulated values
Pump Design Flow:	1000 gpm	Draw down:	40 ft.
Static Water Level:	40 ft *	Projected drawdown:	40.0 ft. at design flow
Pumping Water Level:	80 ft	Projected PWL:	80.0 ft. at design flow
Specific capacity :	25 gpm/ft of D.D.**	Min. pump setting:	100 ft from base plate to top of bowls
Pump bowl design efficiency:	83 %		
Discharge head :	35 ft *		

Notes:

* USGS SCIENTIFIC INVESTIGATIONS MAP 3066
Potentiometric surface in the Magothy and Jameco aquifers—SHEET 2 of 4
Monti, Jack, Jr., and Busciolano, Ronald, 2009,
Water-Table and Potentiometric-Surface Altitudes in the Upper Glacial, Magothy, and Lloyd Aquifers beneath Long Island, New York, in March-

TDH = Lift + Losses + Discharge Head (Computed based on proposed design flow)

Total Dynamic Head Summary		***Design Value Summary***	
Catagory	**Value**	**Catagory**	**Value**
Lift:	80.0 ft.	*Pump design flow :*	1000 gpm
Discharge head:	47 ft.	*Min. pump setting :*	100 ft. at design flow
Major losses:	78.7 ft.	*Total dynamic head:*	225.7 ft.
Minor losses:	20.0 ft.	*Horsepower Required :*	68.7 hp
Calaculated TDH:	**225.7 ft.**	Selected Motor HP:	75 hp

Max Discharge Pressure: 98 psi

Existing pump data: N/A

Existing Parameters		Notes / Comments:
Design flow:	gpm	
Design TDH:	feet	
No. of stages:		
Setting:	feet (base plate to top of bowl assembly)	
Motor H.P.:	H.P.	

Major Losses

Pipe size	Length	Flow		Area	Velocity	h_L/1000	Head
(inches)	(Ft.)	(gpm)	(cfs)	(sq. in.)	(fps)	ft.	Loss (ft.)
10	200	1000	2.23	0.545	4.08	13.7	2.7
20	10000	7000	15.60	2.182	7.15	7.6	76.0
					Subtotal $h_{L\ major}$:		78.7

Minor Losses - Valves, elbows, misc. fittings

	Size	Number	Flow			Area	Velocity	Head
Fitting / Descriptio	(inches)	of units	K	(gpm)	(cfs)	(sq. in.)	(fps)	Loss (ft.)
						Subtotal $h_{L\ minor}$:		20.0

18-INCH PIPE

Discharge in Gallons per 24 Hours	Cubic Feet per Second	Velocity Feet per Second	Velocity Head	Loss of Head in Feet per 1000 feet of length c = 140	c = 130	c = 120	c = 110	c = 100	c = 80	c = 60
200,000	0.309	0.17	0.00	0.008	0.009	0.010	0.012	0.015	0.019	0.022
400,000	0.619	0.35	0.00	0.029	0.033	0.038	0.044	0.052	0.065	0.081
600,000	0.928	0.52	0.00	0.061	0.069	0.078	0.094	0.108	0.137	0.171
800,000	1.238	0.70	0.01	0.103	0.118	0.137	0.160	0.192	0.234	0.292
1,000,000	1.547	0.88	0.01	0.156	0.178	0.204	0.244	0.291	0.365	0.441
1,200,000	1.857	1.05	0.02	0.219	0.251	0.291	0.341	0.408	0.499	0.62
1,400,000	2.166	1.23	0.02	0.290	0.334	0.389	0.454	0.54	0.66	0.82
1,600,000	2.476	1.40	0.03	0.374	0.429	0.495	0.58	0.69	0.85	1.05
1,800,000	2.785	1.57	0.04	0.465	0.54	0.62	0.72	0.86	1.05	1.31
2,000,000	3.094	1.75	0.05	0.56	0.65	0.75	0.88	1.05	1.27	1.58
2,200,000	3.404	1.93	0.06	0.67	0.77	0.89	1.05	1.25	1.52	1.89
2,400,000	3.713	2.10	0.07	0.79	0.90	1.05	1.24	1.47	1.79	2.22
2,600,000	4.023	2.28	0.08	0.92	1.05	1.22	1.43	1.71	2.08	2.58
2,800,000	4.332	2.46	0.09	1.05	1.21	1.39	1.64	1.96	2.38	2.97
3,000,000	4.642	2.63	0.10	1.19	1.37	1.58	1.86	2.22	2.70	3.36
3,500,000	5.41	3.07	0.15	1.58	1.82	2.10	2.48	2.96	3.60	4.48
4,000,000	6.19	3.50	0.19	2.02	2.34	2.70	3.18	3.79	4.60	5.7
4,500,000	6.96	3.94	0.24	2.52	2.90	3.37	3.95	4.71	5.7	7.1
5,000,000	7.74	4.38	0.30	3.07	3.53	4.08	4.80	5.7	7.0	8.7
5,500,000	8.51	4.82	0.36	3.65	4.20	4.85	5.7	6.8	8.3	10.3
6,000,000	9.28	5.25	0.43	4.28	4.95	5.7	6.7	8.0	9.8	12.1
6,500,000	10.05	5.70	0.50	4.96	5.7	6.6	7.8	9.3	11.3	14.1
7,000,000	10.83	6.13	0.58	5.7	6.6	7.6	8.9	10.7	13.0	16.2
7,500,000	11.60	6.57	0.67	6.5	7.5	8.6	10.1	12.1	14.7	18.4
8,000,000	12.38	7.01	0.76	7.3	8.4	9.7	11.4	13.6	16.6	20.7
8,500,000	13.15	7.45	0.86	8.2	9.4	10.9	12.8	15.2	18.6	23.1
9,000,000	13.92	7.89	0.96	9.1	10.5	12.1	14.2	17.0	20.7	25.6
9,500,000	14.70	8.32	1.07	10.1	11.6	13.4	15.7	18.8	22.9	28.3
10,000,000	15.47	8.76	1.19	11.1	12.7	14.8	17.3	20.6	25.1	31.2
11,000,000	17.02	9.64	1.44	13.3	15.2	17.6	20.6	24.6	30.0	37.1
12,000,000	18.57	10.50	1.71	15.6	17.8	20.6	24.2	29.0	35.3	43.8
14,000,000	21.66	12.3	2.33	20.5	23.8	27.3	32.2	38.5	46.8	58
16,000,000	24.76	14.0	3.04	26.2	30.4	35.2	41.3	49.4	60	75
18,000,000	27.85	15.8	3.87	32.7	37.8	43.5	51	61	74	92
20,000,000	30.94	17.5	4.75	40.0	45.6	53	63	74	90	112

20-INCH PIPE

Discharge in Gallons per 24 Hours	Cubic Feet per Second	Velocity Feet per Second	Velocity Head	Loss of Head in Feet per 1000 feet of length c = 140	c = 130	c = 120	c = 110	c = 100	c = 80	c = 60
400,000	0.619	0.28	0.00	0.017	0.020	0.023	0.027	0.032	0.039	0.049
600,000	0.928	0.43	0.00	0.037	0.042	0.049	0.057	0.068	0.083	0.103
800,000	1.238	0.57	0.01	0.062	0.071	0.082	0.097	0.116	0.141	0.175
1,000,000	1.547	0.71	0.01	0.094	0.107	0.124	0.146	0.174	0.213	0.265
1,200,000	1.857	0.85	0.01	0.131	0.151	0.174	0.205	0.244	0.297	0.370
1,400,000	2.166	0.99	0.02	0.174	0.200	0.232	0.272	0.325	0.396	0.49
1,600,000	2.476	1.13	0.02	0.223	0.257	0.298	0.348	0.415	0.51	0.63
1,800,000	2.785	1.28	0.03	0.277	0.319	0.370	0.432	0.52	0.63	0.78
2,000,000	3.094	1.42	0.03	0.336	0.388	0.449	0.53	0.63	0.76	0.95
2,500,000	3.868	1.77	0.05	0.51	0.59	0.68	0.80	0.95	1.16	1.44
3,000,000	4.642	2.13	0.07	0.72	0.82	0.95	1.12	1.33	1.63	2.02
3,500,000	5.41	2.48	0.10	0.95	1.09	1.27	1.49	1.77	2.16	2.69
4,000,000	6.19	2.84	0.13	1.22	1.40	1.62	1.90	2.26	2.77	3.44
4,500,000	6.96	3.19	0.16	1.52	1.74	2.02	2.36	2.82	3.44	4.28
5,000,000	7.73	3.55	0.20	1.84	2.11	2.45	2.88	3.43	4.18	5.2
5,500,000	8.51	3.91	0.24	2.20	2.52	2.93	3.43	4.09	5.0	6.2
6,000,000	9.28	4.26	0.28	2.59	2.97	3.44	4.03	4.81	5.8	7.3
6,500,000	10.06	4.61	0.33	3.00	3.45	3.99	4.68	5.6	6.8	8.4
7,000,000	10.83	4.98	0.38	3.45	3.95	4.58	5.4	6.4	7.8	9.7
7,500,000	11.60	5.32	0.44	3.90	4.48	5.2	6.1	7.3	8.8	11.0
8,000,000	12.38	5.67	0.50	4.40	5.1	5.9	6.9	8.2	10.0	12.4
8,500,000	13.15	6.03	0.56	4.91	5.6	6.6	7.7	9.2	11.2	13.9
9,000,000	13.92	6.38	0.63	5.5	6.3	7.3	8.6	10.2	12.4	15.4
9,500,000	14.70	6.74	0.71	6.0	7.0	8.0	9.4	11.3	13.7	17.1
10,000,000	15.47	7.09	0.78	6.6	7.6	8.8	10.4	12.4	15.1	18.8
11,000,000	17.02	7.80	0.94	7.9	9.1	10.6	12.4	14.8	18.0	22.4
12,000,000	18.57	8.51	1.13	9.3	10.7	12.4	14.6	17.4	21.2	26.3
13,000,000	20.11	9.22	1.32	10.8	12.4	14.4	16.9	20.1	24.6	30.4
14,000,000	21.66	9.93	1.53	12.4	14.2	16.5	19.4	23.1	28.1	35.0
15,000,000	23.21	10.64	1.76	14.1	16.2	18.8	22.0	26.3	32.0	39.8
16,000,000	24.76	11.35	2.00	15.9	18.3	21.1	24.8	29.6	36.1	44.8
17,000,000	26.30	12.06	2.26	17.7	20.4	23.6	27.8	33.1	40.3	50
18,000,000	27.85	12.77	2.53	19.7	22.7	26.3	30.9	36.8	44.8	56
19,000,000	29.40	13.47	2.82	21.8	25.0	29.1	34.1	40.7	49.6	62
20,000,000	30.94	14.18	3.12	24.0	27.6	32.0	37.5	44.8	54	68

AS Tower Blower Sizing			
H_L =	5	inches	
Q=	8600	cfm	
Eff. =	60	%	
HP =	11.25167		
	Go with	15	hp

H2M architects – engineers
[illegible] Road [illegible]
Melville NY 11747 [illegible]

September 24, 2011

Board of Commissioners
South Farmingdale Water District
P.O. Box 3314
Farmingdale, New York 11735

Re: **South Farmingdale Water District**
VOC Treatment at Plant No. 1
Contract G – General and Mechanical Construction
H2M Project No.: SFWD 08-13
Payment Request No. 17 - Partial

Gentlemen:

This is to report that Philip Ross Industries, Inc. of Wyandanch, New York in accordance with their contract and based on our firm's observation, has completed and is entitled to payment for the following work:

ITEM NO.	DESCRIPTION	CONTRACT AMOUNT	AMOUNT APPROVED
1	General and Mechanical Construction	$ 6,642,000.00	$ 6,642,000.00
2	Cash Allowance	$ 105,000.00	$ 45,781.00
	Original Contract Amount	$ **6,747,000.00**	
CO E-1	3 Valve Cluster	$ 3,620.00	$ 3,620.00
CO E-2	Door Hardware – Access Control	$ 12,840.00	$ 12,840.00
CO E-3	Structural Steel	$ 138,172.00	$ 138,172.00
CO E-4	Drainage, Curbs, Gas Header	$ 34,572.56	$ 34,572.56
	Modified Contract Amount	$ **6,936,204.56**	
	Amount Completed To Date		$ **6,876,985.56**
	Less Retainage		$ **50,000.00**
	Less Previous Payments		$ **6,776,285.56**
	Total Amount Payable		$ **50,700.00**

We are enclosing a copy of the certified payroll records as submitted by the contractor for the work included within this payment request.

Should you have any questions, please feel free to contact our office.

Very truly yours,

HOLZMACHER, McLENDON & MURRELL, P.C.

Gary E. Loesch, P.E.
Executive Vice President

GEL/aka

cc: Superintendent Charles Pruche
Leonard Constantinopoli, Business Manager
Willis B. Carman, Esq.
Philip Carlucci, Phillip Ross Industries, Inc.

[illegible]

architects – engineers

June 30, 2011

Board of Commissioners
South Farmingdale Water District
P.O. Box 3319
Farmingdale, New York 11735

Re: South Farmingdale Water District
VOC Treatment at Plant No. 1
Contract E – Electrical Construction
H2M Project No.: SFWD 08-13
Payment Request No. 9E - Partial

Gentlemen:

This is to report that JVR Electric, Inc. of Medford, New York, in accordance with their contract and based on our firm's observation, has completed and is entitled to payment for the following work:

ITEM NO.	DESCRIPTION	CONTRACT AMOUNT	AMOUNT APPROVED
1	Electrical Demolition Work	$ 86,650.00	$ 86,650.00
2	New Electrical Service	$ 115,000.00	$ 115,000.00
3	New Electrical Site Work	$ 64,800.00	$ 64,800.00
4	Motor Control Center	$ 570,000.00	$ 570,000.00
5	New Electrical Work at the New Treatment Building	$ 306,500.00	$ 306,500.00
6	New Treatment Building Controls	$ 400,793.00	$ 400,793.00
7	Electrical Work at Well No. 1-2	$ 68,960.00	$ 68,960.00
8	Electrical Work at Well No. 2-3	$ 86,775.00	$ 86,775.00
9	Administration Building	$ 28,650.00	$ 28,650.00
10	Cash Allowance	$ 25,000.00	$ 1,085.00
11	O & M Manuals	$ 5,000.00	$ 5,000.00
12	Record Drawings	$ 8,500.00	$ 0,500.00
13	Control Modifications	$ 12,000.00	$ 12,000.00
	Original Contract Amount	$ 1,738,428.00	
CO 1	Horsepower Increases at Wells 1-2/1-3	$ 24,683.00	$ 24,683.00
	Modified Contract Amount	$ 1,763,111.00	
	Amount Completed To Date		$ 1,739,196.00
	Less 5% Retainage		$ 86,959.80
	Less Previous Payments		$ 1,579,755.58
	Total Amount Payable		$ 72,480.62

Well No.:	Booster Pump	***Authorized capacity:***	1400 gpm		
Location:	Treatment Plant	***Well pumps to:***	Injection wells	***Calculation Number :***	1
Date:	3/6/2012	***Calculated by:***	PJG		

Parameter	Input data	Parameter	Caclulated values
Pump Design Flow:	1400 gpm	Lift:	12 ft.
Pump center line Elev. :	0 ft *	Suction Press at full tank:	0.0 ft. at design flow
CW low water level Elev. :	-12 ft *		
CWhigh water level Elev.:	0 ft *		
Pump bowl design efficiency:	82 %		
Discharge head :	ft *		

Notes:
* Datum - mean sea level CW - Clearwell
** Actual field data

TDH = Lift + Losses + Discharge Head (Computed based on proposed design flow)

Total Dynamic Head Summary		***Design Value Summary***	
Catagory	**Value**	**Catagory**	**Value**
Lift:	12.0 ft.	*Pump design flow :*	1400 gpm
Discharge head:	15.0 ft. (estimated)		
Major losses:	7.4 ft.	*Total dynamic head:*	111.6 ft.
Minor losses:	77.2 ft.	*Horsepower Required :*	48.1 hp
Calaculated TDH:	111.6 **ft.**	Motor size:	50 hp
Max Discharge Pressure:	43 psi		

Major Losses							
Pipe size (inches)	**Length (Ft.)**	**Flow (gpm)**	**(cfs)**	**Area (sq. in.)**	**Velocity (fps)**	**h_L/1000 ft.**	**Head Loss (ft.)**
10	40	1400	3.12	0.545	5.72	10.8	0.4
12	0	0	0.00	0.785	0.00	0	0.0
16	0	0	0.00	1.396	0.00	16.6	0.0
20	10100	7000	15.60	2.182	7.15	7.6	76.8
						Subtotal $h_{L\ major}$:	77.2

Minor Losses - Valves, elbows, misc. fittings								
Fitting / Description	**Size (inches)**	**Number of units**	**K**	**Flow (gpm)**	**(cfs)**	**Area (sq. in.)**	**Velocity (fps)**	**Head Loss (ft.)**
Column - 1-15/16 shaft	10	1	0.02	1000	2.23	0.545	4.08	0.0
Discharge head	10	1	n/a	1000	2.23	0.545	4.08	0.4
Elbow - 90 degrees	10	0	0.9	1000	2.23	0.545	4.08	0.0
Elbow - 90 degrees	16	0	0.9	4000	8.91	1.396	6.38	0.0
Elbow - 45 degrees	10	2	0.15	1000	2.23	0.545	4.08	0.1
Elbow - 45 degrees	16	0	0.15	4000	8.91	1.396	6.38	0.0
Elbow - 45 degrees	20	1	0.15	4000	8.91	2.182	4.08	0.0
Check valve	10	1	2.5	1000	2.23	0.545	4.08	0.6
Gate valve	10	3	0.2	1000	2.23	0.545	4.08	0.2
Gate valve	12	0	0.2	0	0.00	0.785	0.00	0.0
Gate valve	16	1	0.2	4000	8.91	1.396	6.38	0.1
Flow Meter -Orifice Plate	10	1	n/a	1180	2.63	0.545	4.82	5.0
							Subtotal $h_{L\ minor}$:	6.5

Minor losses - Tees, reducers and increasers											
Fitting / Description	**Line / up Size -1 (inches)**	**Branch/down Size -2 (inches)**	**Number of units**	**K**	**Flow (gpm)**	**(cfs)**	**Area-1 (sq. in.)**	**Area-2 (sq. in.)**	**Velocity-1 (fps)**	**Velocity-2 (fps)**	**Head Loss (ft.)**
Tee	10	20	1	1.8	1000	2.23	0.545	2.182	4.08	1.02	0.5
Tee	10	16	1	1.8	1000	2.23	0.545	1.396	4.08	1.60	0.5
Tee	20	16	0	1.8	0	0.00	2.182	1.396	0.00	0.00	0.0
Increaser	10	12	0	0.17	0	0.00	0.545	0.785	0.00	0.00	0.0
Increaser	12	16	0	0.17	0	0.00	0.785	1.396	0.00	0.00	0.0
Increaser	16	20	0	0.17	0	0.00	1.396	2.182	0.00	0.00	0.0
										Subtotal $h_{L\ minor}$:	0.9